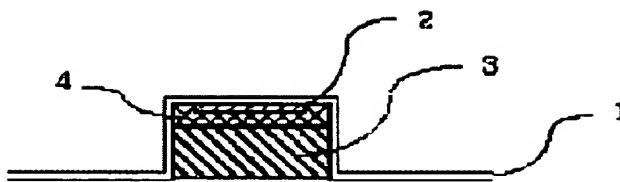


LIGHTING SHEET-LIKE KEY TOP**Publication number:** JP2000285760**Publication date:** 2000-10-13**Inventor:** MOTOMATSU YOSHIFUMI**Applicant:** POLYMATECH CO LTD**Classification:****- International:** H01H9/16; H01H13/02; H01H9/16; H01H13/02; (IPC1-7):
H01H9/16; H01H13/02**- european:****Application number:** JP19990093507 19990331**Priority number(s):** JP19990093507 19990331[Report a data error here](#)**Abstract of JP2000285760**

PROBLEM TO BE SOLVED: To attain reduction in cost and reduction in thickness and weight by forming a dispersion type EL, consisting of a transparent electrode layer that is an organic polymer layer, a compensating electrode layer, an emitter layer, a dielectric layer, a back face electrode layer, and an insulating layer on the lower surface of a resin film curved in the same form as a resin-made key top body and formed integrally on the upper surface side thereof. **SOLUTION:** A display part 2 of characters or patterns is formed on the reverse face of a light transmissive resin film 1 by screen printing. A transparent electrode layer, that is an organic polymer layer, a compensating electrode layer, emitter layer, dielectric layer, back face electrode layer, and insulating layer are successively formed on the whole reverse face of the resin film 1 which has the display part 2 to form the part of an EL 4. The resin film 1 having the display part 2 and the EL 4 is set in an injection molding die, and the resin film 1 is curved by the pressure of the melted resin to form a key top body 3. According to this, the structure is simplified, the number of part items is reduced, and the display part 2 can be lighted with high luminance.



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PATENT ABSTRACTS OF JAPAN

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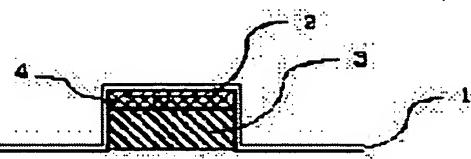
(72)Inventor : MOTOMATSU YOSHIFUMI

(54) LIGHTING SHEET-LIKE KEY TOP

(57)Abstract:

PROBLEM TO BE SOLVED: To attain reduction in cost and reduction in thickness and weight by forming a dispersion type EL, consisting of a transparent electrode layer that is an organic polymer layer, a compensating electrode layer, an emitter layer, a dielectric layer, a back face electrode layer, and an insulating layer on the lower surface of a resin film curved in the same form as a resin-made key top body and formed integrally on the upper surface side thereof.

SOLUTION: A display part 2 of characters or patterns is formed on the reverse face of a light transmissive resin film 1 by screen printing. A transparent electrode layer, that is an organic polymer layer, a compensating electrode layer, emitter layer, dielectric layer, back face electrode layer, and insulating layer are successively formed on the whole reverse face of the resin film 1 which has the display part 2 to form the part of an EL 4. The resin film 1 having the display part 2 and the EL 4 is set in an injection molding die, and the resin film 1 is curved by the pressure of the melted resin to form a key top body 3. According to this, the structure is simplified, the number of part items is reduced, and the display part 2 can be lighted with high luminance.



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CLAIMS

[Claim(s)]

[Claim 1] The illumination type sheet-like keytop characterized by really coming to form the resin film of the light transmission nature incurvated in the shape of isomorphism to the top-face side of the keytop body which consists of resin, and forming in the underside of said resin film the distributed process input output equipment EL (henceforth, EL) which consists of the transparent electrode layer which is an organic macromolecule layer, a compensation electrode layer, an emitter layer, a dielectric layer, a back plate layer, and an insulating layer.

[Claim 2] The illumination type sheet-like keytop according to claim 1 characterized by forming the display in a resin film.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the illumination type sheet-like keytop of the keytop in various electronic equipment, such as telephone, a personal computer keyboard, and a controller.

[0002]

[Description of the Prior Art] In recent years, also in the switch used for the control unit, want of a miniaturization, thin-shape-izing, and lightweight-izing has become strong with the miniaturization of electronic equipment, and carrying-izing. Conventionally, there is a sheet-like keytop which really comes to form the resin film of the light transmission nature incurvated in the shape of isomorphism in the top-face side of the keytop body which consists of resin which is illustrated to drawing 2 as a keytop used for a miniaturization, thin-shape-izing, and lightweight-ization. The device in the case of adding the illumination function which used EL for this sheet-like keytop was making the keytop section illuminate combining EL under the sheet-like keytop.

[0003]

[Problem(s) to be Solved by the Invention] However, by the device of the conventional illumination, since there were many components mark and a configuration was complicated, it increased like the erector, and thin-shape-izing and lightweight-izing are difficult, and a cost cut was not able to be aimed at further. Moreover, since light passed along that there is distance of EL and the front face of a keytop, and the keytop body which consists of resin of translucency, there was a trouble of light declining. Although the trial which incurvated the conventional EL in the shape of isomorphism the top-face side of a keytop body was also considered, since it was the inorganic substance thin film which formed indium tin oxide (ITO) by sputtering and was extended while a resin film is bent in case a resin film is made to transform into a bow, the ITO film fractured the transparent electrode layer of the conventional EL, and it was not able to be realized.

[0004]

[Means for Solving the Problem] This invention solves such a conventional problem, and structure is easy and it aims to let it offer the illumination type sheet-like keytop which has the illumination device in which thin-shape-izing and lightweight-izing are possible. This invention was using EL of the transparent electrode layer which is an organic macromolecule layer, and when a resin film deformed, it elongated, while the transparent electrode layer followed the resin film, and it avoided fracture of a transparent electrode layer.

[0005] That is, it is the illumination type sheet-like keytop by which really comes to form the resin film of the light transmission nature incurvated in the shape of isomorphism to the top-face side of the keytop body which consists of resin, and EL which consists of intrinsically the transparent electrode layer which is an organic macromolecule layer, a compensation electrode layer, an emitter layer, a dielectric layer, a back plate layer, and an insulating layer is formed in the underside of said resin film. Furthermore, it is the illumination type sheet-like keytop by which the display is formed in the resin film.

[0006] The transparent electrode layer which is an organic macromolecule layer of this invention is a layer which the conductive powder of light transmission nature distributed in the transparent organic macromolecule. The conductive powder of the light transmission nature of this invention has the optimal activity of the conductive powder of an ITO system excellent in especially conductivity and transparency, although oxides, such as indium tin oxide (ITO) and antimony oxide tin (ATO), are mentioned.

[0007] And the transparent organic macromolecule of this invention is a liquefied organic macromolecule, is hardened with heat, light, moisture, etc. and forms a transparent layer. Construction material selects the layer of a resin film or others, and the thing to paste up suitably. this invention — setting — between a resin film and EL — or a display can be prepared in the front face of a resin film. Since the outermost surface becomes a resin film especially when a display is prepared between a resin film and EL, wear-resistant improvement in a display can be aimed at.

[0008] The resin of the keytop body of this invention has at least one desirable resin chosen from polypropylene, polyurethane, a polyamide, polymethylmethacrylate, polyethylene terephthalate, polybutylene terephthalate, a polycarbonate, polystyrene, and polyacrylonitrile styrene butadiene rubber.

[0009] The resin film of the light transmission nature which forms EL of this invention has at least one desirable resin film chosen from a polyethylene terephthalate film, a polybutylene terephthalate film, a polyurethane film, a polyamide film, a polyethylenenaphthalate film, a polypropylene film, a polystyrene film, a fluorine film, an ionomer film, a polycarbonate film, and a polyvinyl chloride film.

[0010] The ink which prints a display on the resin film of the light transmission nature of this invention has at least one desirable ink chosen from acrylic, a vinyl chloride system, an urethane system, an ester system, and an epoxy system. Hereafter, the gestalt of operation of this invention is explained to a detail based on a drawing.

[0011]

[Embodiment of the Invention] Drawing 1 is the sectional view of the gestalt of operation of the illumination type sheet-like keytop of this invention. EL4 which consists of a transparent electrode layer, a compensation electrode layer, an emitter layer, a dielectric layer, a back plate layer, and an insulating layer is formed only in the rear face of the display 2 of the resin film 1 of light transmission nature, and it is further constituted by the keytop body 3.

[0012] The manufacture approach of the illumination type sheet-like keytop of this invention forms the displays 2, such as an alphabetic character and a graphic form, in the resin film 1 of light transmission nature by screen-stencil in ink. Next, by screen-stencil,

sequential formation of a transparent electrode layer, a compensation electrode layer, an emitter layer, a dielectric layer, a back plate layer, and the insulating layer is carried out, and the part of EL4 is formed in the resin film 1 which has said display. Next, the resin film which has said display and EL is set to injection-molding metal mold, a resin film is incurvated by the pressure of the fused resin, and the keytop body 3 is formed. Even if it sticks a resin film and a keytop body by thermal melting arrival at this time, it does not matter even if it makes it stick through a glue line.

[0013]

[Example 1] The displays 2, such as an alphabetic character and a graphic form, were formed in the rear face of the resin film 1 of a polyethylene terephthalate film by screen-stencil in acrylic ink. At all the rear face of the resin film 1 which has said display 2, by screen-stencil Next, a transparent electrode layer (Sumitomo Osaka Cement ITO system ink). A compensation electrode layer (dotite FA[by FUJIKURA KASEI CO., LTD.]- 312), an emitter layer (dotite FEL[by FUJIKURA KASEI CO., LTD.]- 125), Sequential formation of a dielectric layer (dotite FEL[by FUJIKURA KASEI CO., LTD.]- 615), a back plate layer (dotite FEC[by FUJIKURA KASEI CO., LTD.]- 198), and the insulating layer (XB[by FUJIKURA KASEI CO., LTD.]- 101 G) was carried out, and the part of EL4 was formed. The layer which stiffened with heat what blended the conductive powder of an ITO system with the liquefied organic macromolecule which dissolved polyester system resin with the solvent was used for the transparent electrode layer.

[0014] Next, the resin film 1 which has said display 2 and EL4 was set to injection-molding metal mold, the resin film 1 was incurvated by the pressure of the fused poly car NETO resin, the keytop body 3 was formed, and the illumination type sheet-like keytop as shown in drawing 3 was obtained. By the illumination type sheet-like keytop of this example, the configuration became simple and components mark decreased. Since an illumination side is furthermore near a keytop front face and there is almost no attenuation of light, it becomes possible to illuminate a display by high brightness. Moreover, the open circuit of EL did not take place at the time of bow shaping of a resin film.

[0015]

[The example 1 of a comparison] The displays 2, such as an alphabetic character and a graphic form, were formed in the rear face of the resin film 1 of a polyethylene terephthalate film by screen-stencil in acrylic ink. Next, the resin film 1 which has said display 2 was set to injection-molding metal mold, the resin film 1 was incurvated by the pressure of the fused polyethylene terephthalate resin, the keytop body 3 was formed, and the sheet-like keytop shown in drawing 2 was obtained. When it used combining EL created separately, it became and complicated constituting components mark and it was as much as the erector to the sheet-like keytop of this example of a comparison. Moreover, since there was distance on EL and the front face of a keytop, light declined.

[0016]

[Effect of the Invention] Since a sheet-like keytop and EL were unified according to the illumination type sheet-like keytop concerning this invention as explained to the detail above, it is easy that a configuration is simple and for components mark to decrease, consequently to attain the simplicity which is like [erector], cost cut, thin-shape-izing, and lightweight-ization. Moreover, since an illumination side is near a keytop front face and there is almost no attenuation of light, it becomes possible to illuminate a display by high brightness.

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TECHNICAL FIELD

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PRIOR ART

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EFFECT OF THE INVENTION

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MEANS

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of the illumination type sheet-like keytop of this invention

[Drawing 2] The sectional view of the conventional sheet-like keytop

[Drawing 3] The sectional view of the example of this invention

[Description of Notations]

- 1 Resin Film
- 2 Display
- 3 Keytop Body
- 4 EL

[Translation done.]

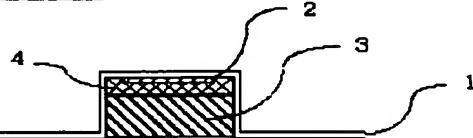
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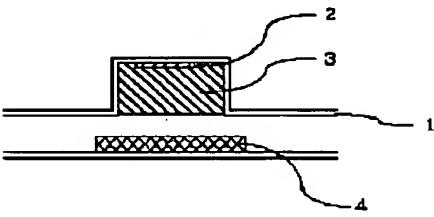
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DRAWINGS

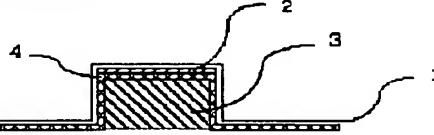
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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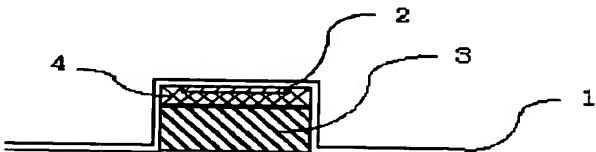
Fターム(参考) 5Q006 AA01 CD06 JA01 JB06 JF02
5G052 AA21 BB01 JB08 JB13

(54)【発明の名称】 照光式シート状キートップ

(57)【要約】

【課題】構成が単純かつ部品点数が少く、したがって、組立工程の簡略、コストダウン、薄型化、軽量化を図ることが容易であり、また、照光面における光の減衰がほとんど無く、高輝度で表示部を照光することが可能な照光機構を有する照光式シート状キートップ

【解決手段】樹脂からなるキートップ本体の上面側に、同形状に湾曲させた光透過性の樹脂フィルムが一体形成され、前記樹脂フィルムの下面に、有機高分子層である透明電極層、補償電極層、発光体層、誘電体層、背面電極層、絶縁層から構成されるE Lを形成した



【特許請求の範囲】

【請求項1】樹脂からなるキートップ本体の上面側に、同形状に湾曲させた光透過性の樹脂フィルムが一体形成されてなり、前記樹脂フィルムの下面に、有機高分子層である透明電極層、補償電極層、発光体層、誘電体層、背面電極層、絶縁層から構成される分散型EL(以下EL)が形成されていることを特徴とする照光式シート状キートップ。

【請求項2】樹脂フィルムに表示部が形成されていることを特徴とする請求項1に記載の照光式シート状キートップ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、電話機、パソコンキーボード、コントローラ等の各種電子機器におけるキートップの照光式シート状キートップに関するものである。

【0002】

【従来技術】近年、電子機器の小型化、携帯化に伴い、その操作部に用いるスイッチにおいても小型化、薄型化、軽量化の要望が強まっている。従来、小型化、薄型化、軽量化に用いられるキートップとして、図2に例示するような、樹脂からなるキートップ本体の上面側に、同形状に湾曲させた光透過性の樹脂フィルムが一体形成されてなるシート状キートップがある。このシート状キートップにELを用いた照光機能を付加する場合の機構は、シート状キートップの下方にELを組合させて、キートップ部を照光させていた。

【0003】

【発明が解決しようとする課題】しかしながら、従来の照光の機構では、部品点数が多く構成が複雑化するため、組立工程が増加し、薄型化、軽量化が困難であり、さらにコストダウンが図れなかった。また、ELとキートップの表面との距離があること、透光性の樹脂からなるキートップ本体を光が通る為、光が減衰するなどの問題点があった。従来のELをキートップ本体の上面側と同形状に湾曲させた試験も検討したが、従来のELの透明電極層は、酸化インジウムスズ(ITO)をスパッタリングで成膜した無機物薄膜であるため、樹脂フィルムを湾曲に変形させる際、樹脂フィルムが曲げられながら引き伸ばされる為、ITO膜が破断してしまい実現できなかった。

【0004】

【課題を解決するための手段】本発明は、このような従来の問題を解決するものであり、構造が簡単で薄型化、軽量化が可能な照光機構を有する照光式シート状キートップを提供することを目的とする。本発明は、有機高分子層である透明電極層のELを用いることで、樹脂フィルムが変形する際に、透明電極層が樹脂フィルムに追従しながら伸長し、透明電極層の破断を回避した。

【0005】すなわち、樹脂からなるキートップ本体の上面側に、同形状に湾曲させた光透過性の樹脂フィルムが一体形成されてなり、前記樹脂フィルムの下面に、有機高分子層である透明電極層、補償電極層、発光体層、誘電体層、背面電極層、絶縁層から本質的に構成されるELが形成されている照光式シート状キートップである。さらに、樹脂フィルムに表示部が形成されている照光式シート状キートップである。

【0006】本発明の有機高分子層である透明電極層は、光透過性の導電性粉末が、透明な有機高分子中に分散した層である。本発明の光透過性の導電性粉末は、酸化インジウムスズ(ITO)、酸化アンチモンスズ(ATO)等の酸化物が挙げられるが、特に導電性と透明性が優れているITO系の導電性粉末の使用が最適である。

【0007】そして、本発明の透明な有機高分子は、液状の有機高分子で、熱、光、湿気等により硬化して透明な層を形成する。材質は、樹脂フィルムやその他の層と接着するものを適宜に選定する。本発明において、樹脂フィルムとELの間に、もしくは樹脂フィルムの表面に表示部を設けることができる。特に樹脂フィルムとELの間に表示部を設けた場合は、最表面が樹脂フィルムになるので、表示部の耐摩耗性の向上を図ることができる。

【0008】本発明のキートップ本体の樹脂は、ポリプロピレン、ポリウレタン、ポリアミド、ポリメチルメタクリレート、ポリエチレンテレフタレート、ポリブチレンテレフタレート、ポリカーボネート、ポリスチレン、ポリアクリロニトリルバジエンスチレンより選ばれる少なくとも1つの樹脂が好ましい。

【0009】本発明のELを形成する光透過性の樹脂フィルムは、ポリエチレンテレフタレートフィルム、ポリブチレンテレフタレートフィルム、ポリウレタンフィルム、ポリアミドフィルム、ポリエチレンナフタレートフィルム、ポリプロピレンフィルム、ポリスチレンフィルム、フッ素フィルム、アイオノマーフィルム、ポリカーボネートフィルム、ポリ塩化ビニルフィルムより選ばれる少なくとも1つの樹脂フィルムが好ましい。

【0010】本発明の光透過性の樹脂フィルムに表示部を印刷するインキは、アクリル系、塩ビ系、ウレタン系、エステル系、エポキシ系より選ばれる少なくとも1つのインキが好ましい。以下、本発明の実施の形態を図面に基づいて詳細に説明する。

【0011】

【発明の実施の形態】図1は、本発明の照光式シート状キートップの実施の形態の断面図である。光透過性の樹脂フィルム1の表示部2の裏面にのみ透明電極層、補償電極層、発光体層、誘電体層、背面電極層、絶縁層からなるEL4が形成してあり、さらに、キートップ本体3によって構成されている。

【0012】本発明の照光式シート状キートップの製造方法は、光透過性の樹脂フィルム1にインキにて文字や図形等の表示部2をスクリーン印刷にて形成する。次に、前記表示部を有する樹脂フィルム1に、スクリーン印刷にて透明電極層、補償電極層、発光体層、誘電体層、背面電極層、絶縁層を順次形成し、E L 4の部位を形成する。次に、前記表示部とE Lを有する樹脂フィルムを射出成形金型にセットし、溶融した樹脂の圧力で樹脂フィルムを湾曲させキートップ本体3を形成する。この時、樹脂フィルムとキートップ本体は熱融着により密着させても、接着層を介して密着させても構わない。

【0013】

【実施例1】ポリエチレンテレフタレートフィルムの樹脂フィルム1の裏面に、アクリル系インキにて文字や図形等の表示部2をスクリーン印刷にて形成した。次に、前記表示部2を有する樹脂フィルム1の全裏面に、スクリーン印刷にて透明電極層（住友大阪セメント（株）製ITO系インク）、補償電極層（藤倉化成（株）製ドータイトFA-312）、発光体層（藤倉化成（株）製ドータイトFEL-125）、誘電体層（藤倉化成（株）製ドータイトFEL-615）、背面電極層（藤倉化成（株）製ドータイトFEC-198）、絶縁層（藤倉化成（株）製XB-101G）を、順次形成し、E L 4の部位を形成した。透明電極層には、ポリエスチル系樹脂を溶剤で溶解した液状の有機高分子に、ITO系の導電性粉末を配合したものを熱で硬化させた層を用いた。

【0014】次に、前記表示部2とE L 4を有する樹脂フィルム1を射出成形金型にセットし、溶融したポリカーネート樹脂の圧力で樹脂フィルム1を湾曲させキートップ本体3を形成し、図3に示すような照光式シート状キートップを得た。本実施例の照光式シート状キートップによって構成が単純になり、部品点数が減少した。さらに照光面がキートップ表面付近にある為、光の減衰が

ほとんど無いので、高輝度で表示部を照光することが可能になる。また樹脂フィルムの湾曲成形時にE Lの断線は起らなかった。

【0015】

【比較例1】ポリエチレンテレフタレートフィルムの樹脂フィルム1の裏面に、アクリル系インキにて文字や図形等の表示部2をスクリーン印刷にて形成した。次に、前記表示部2を有する樹脂フィルム1を射出成形金型にセットし、溶融したポリエチレンテレフタレート樹脂の

10 圧力で樹脂フィルム1を湾曲させキートップ本体3を形成し、図2に示すシート状キートップを得た。本比較例のシート状キートップは、別途作成したE Lと組み合わせて用いた場合、部品点数が多く構成が複雑となり、組立工程が多かった。またE Lとキートップ表面との距離がある為、光が減衰された。

【0016】

【発明の効果】以上詳細に説明したように、本発明にかかる照光式シート状キートップによれば、シート状キートップとE Lが一体化された為、構成が単純かつ部品点数が減少し、その結果、組立工程の簡略、コストダウン、薄型化、軽量化を図ることが容易である。また、照光面がキートップ表面付近にある為、光の減衰がほとんど無いので、高輝度で表示部を照光することが可能になる。

【図面の簡単な説明】

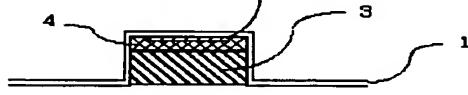
【図1】本発明の照光式シート状キートップの断面図

【図2】従来のシート状キートップの断面図

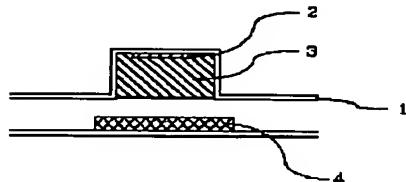
【図3】本発明の実施例の断面図

【符号の説明】

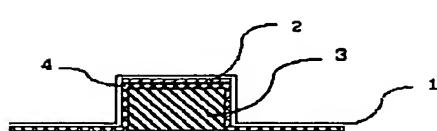
- 30 1 樹脂フィルム
2 表示部
3 キートップ本体
4 E L



【図1】



【図2】



【図3】